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## SEQUENCE LISTING

5 <110> Microbiological Research Authority  
 HALLIS, Bassam  
 SILMAN, Nigel  
 SHONE, Clifford Charles  
 SUTTON, John Mark

10 <120> Delivery of Superoxide Dismutase to Neuronal Cells  
 <130> 20994-SOD-heavy chain conjugates

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<150> GB 9824282.9  
 <151> 1998-11-05

20 <160> 11  
 <170> PatentIn Ver. 2.1

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 35 35 40 45  
 Leu Gln Asn Lys Ser Leu Glu Glu Leu Leu Ser Asn Leu Glu Ala Leu  
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 Pro Glu Ser Ile Arg Thr Ala Val Arg Asn Asn Gly Gly Gly His Ala  
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 Thr Ala Phe Lys Asp Glu Phe Ser Lys Ala Ala Ala Gly Arg Phe Gly  
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 Ser Thr Pro Asn Gln Asp Ser Pro Ile Met Glu Gly Lys Thr Pro Ile  
 145 150 155 160  
 Leu Gly Leu Asp Val Trp Glu His Ala Tyr Tyr Leu Lys Tyr Gln Asn  
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 35 Ser Thr Pro Asn Gln Asp Ser Pro Ile Met Glu Gly Lys Thr Pro Ile  
 145 150 155 160  
 40 Leu Gly Leu Asp Val Trp Glu His Ala Tyr Tyr Leu Lys Tyr Gln Asn  
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 Arg Arg Pro Glu Tyr Ile Ala Ala Phe Trp Asn Val Val Asn Trp Asp  
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 35 40 45

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|    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|    | Leu | Gln | Asn | Lys | Ser | Leu | Glu | Glu | Leu | Leu | Ser | Asn | Leu | Glu | Ala | Leu |
|    | 50  |     |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| 5  | Pro | Glu | Ser | Ile | Arg | Thr | Ala | Val | Arg | Asn | Asn | Gly | Gly | Gly | His | Ala |
|    | 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
|    | Asn | His | Ser | Leu | Phe | Trp | Thr | Ile | Leu | Ser | Pro | Asn | Gly | Gly | Gly | Glu |
|    |     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| 10 | Pro | Thr | Gly | Glu | Leu | Ala | Asp | Ala | Ile | Asn | Lys | Lys | Phe | Gly | Ser | Phe |
|    |     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
|    | Thr | Ala | Phe | Lys | Asp | Glu | Phe | Ser | Lys | Ala | Ala | Ala | Gly | Arg | Phe | Gly |
|    |     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| 15 | Ser | Gly | Trp | Ala | Trp | Leu | Val | Val | Asn | Asn | Gly | Glu | Leu | Glu | Ile | Thr |
|    | 130 |     |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| 20 | Ser | Thr | Pro | Asn | Gln | Asp | Ser | Pro | Ile | Met | Glu | Gly | Lys | Thr | Pro | Ile |
|    | 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
|    | Leu | Gly | Leu | Asp | Val | Trp | Glu | His | Ala | Tyr | Tyr | Leu | Lys | Tyr | Gln | Asn |
|    |     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |
| 25 | Arg | Arg | Pro | Glu | Tyr | Ile | Ala | Ala | Phe | Trp | Asn | Val | Val | Asn | Trp | Asp |
|    |     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
|    | Glu | Val | Ala | Lys | Arg | Tyr | Ser | Glu | Ala | Lys | Ala | Lys | Gln | Arg | Ser | Cys |
|    |     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| 30 | Gly | Leu | Val | Pro | Arg | Gly | Ser | Gly | Pro | Gly | Ser | Ala | Leu | Asn | Asp | Leu |
|    |     | 210 |     |     |     | 215 |     |     |     |     |     | 220 |     |     |     |     |
| 35 | Cys | Ile | Lys | Val | Asn | Asn | Trp | Asp | Leu | Phe | Phe | Ser | Pro | Ser | Glu | Asp |
|    | 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
|    | Asn | Phe | Thr | Asn | Asp | Leu | Asn | Lys | Gly | Glu | Glu | Ile | Thr | Ser | Asp | Thr |
|    |     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |
| 40 | Asn | Ile | Glu | Ala | Ala | Glu | Glu | Asn | Ile | Ser | Leu | Asp | Leu | Ile | Gln | Gln |
|    |     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
|    | Tyr | Tyr | Leu | Thr | Phe | Asn | Phe | Asp | Asn | Glu | Pro | Glu | Asn | Ile | Ser | Ile |
|    |     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| 45 | Glu | Asn | Leu | Ser | Ser | Asp | Ile | Ile | Gly | Gln | Leu | Glu | Leu | Met | Pro | Asn |
|    |     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| 50 | Ile | Glu | Arg | Phe | Pro | Asn | Gly | Lys | Lys | Tyr | Glu | Leu | Asp | Lys | Tyr | Thr |
|    | 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
|    | Met | Phe | His | Tyr | Leu | Arg | Ala | Gln | Glu | Phe | Glu | His | Gly | Lys | Ser | Arg |
|    |     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| 55 | Ile | Ala | Leu | Thr | Asn | Ser | Val | Asn | Glu | Ala | Leu | Leu | Asn | Pro | Ser | Arg |
|    |     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
|    | Val | Tyr | Thr | Phe | Phe | Ser | Ser | Asp | Tyr | Val | Lys | Lys | Val | Asn | Lys | Ala |
|    |     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| 60 | Thr | Glu | Ala | Ala | Met | Phe | Leu | Gly | Trp | Val | Glu | Gln | Leu | Val | Tyr | Asp |
|    |     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| 65 | Phe | Thr | Asp | Glu | Thr | Ser | Glu | Val | Ser | Thr | Thr | Asp | Lys | Ile | Ala | Asp |
|    | 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
|    | Ile | Thr | Ile | Ile | Ile | Pro | Tyr | Ile | Gly | Pro | Ala | Leu | Asn | Ile | Gly | Asn |

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|    | 405  | 410 | 415 |
|----|--|-----|-----|
| 5  | Met Leu Tyr Lys Asp Asp Phe Val Gly Ala Leu Ile Phe Ser Gly Ala<br>420 425 430     |     |     |
|    | Val Ile Leu Leu Glu Phe Ile Pro Glu Ile Ala Ile Pro Val Leu Gly<br>435 440 445     |     |     |
| 10 | Thr Phe Ala Leu Val Ser Tyr Ile Ala Asn Lys Val Leu Thr Val Gln<br>450 455 460     |     |     |
|    | Thr Ile Asp Asn Ala Leu Ser Lys Arg Asn Glu Lys Trp Asp Glu Val<br>465 470 475 480 |     |     |
| 15 | Tyr Lys Tyr Ile Val Thr Asn Trp Leu Ala Lys Val Asn Thr Gln Ile<br>485 490 495     |     |     |
|    | Asp Leu Ile Arg Lys Lys Met Lys Glu Ala Leu Glu Asn Gln Ala Glu<br>500 505 510     |     |     |
| 20 | Ala Thr Lys Ala Ile Ile Asn Tyr Gln Tyr Asn Gln Tyr Thr Glu Glu<br>515 520 525     |     |     |
|    | Glu Lys Asn Asn Ile Asn Phe Asn Ile Asp Asp Leu Ser Ser Lys Leu<br>530 535 540     |     |     |
| 25 | Asn Glu Ser Ile Asn Lys Ala Met Ile Asn Ile Asn Lys Phe Leu Asn<br>545 550 555 560 |     |     |
|    | Gln Cys Ser Val Ser Tyr Leu Met Asn Ser Met Ile Pro Tyr Gly Val<br>565 570 575     |     |     |
| 30 | Lys Arg Leu Glu Asp Phe Asp Ala Ser Leu Lys Asp Ala Leu Leu Lys<br>580 585 590     |     |     |
|    | Tyr Ile Tyr Asp Asn Arg Gly Thr Leu Ile Gly Gln Val Asp Arg Leu<br>595 600 605     |     |     |
| 35 | Lys Asp Lys Val Asn Asn Thr Leu Ser Thr Asp Ile Pro Phe Gln Leu<br>610 615 620     |     |     |
|    | Ser Lys Tyr Val Asp Asn Gln Arg Leu Leu Ser Thr Phe Thr Glu Tyr<br>625 630 635 640 |     |     |
| 40 | Ile Lys Asn Ile Ile Asn Thr Ser Ile Leu Asn Leu Arg Tyr Glu Ser<br>645 650 655     |     |     |
|    | Asn His Leu Ile Asp Leu Ser Arg Tyr Ala Ser Lys Ile Asn Ile Gly<br>660 665 670     |     |     |
| 45 | Ser Lys Val Asn Phe Asp Pro Ile Asp Lys Asn Gln Ile Gln Leu Phe<br>675 680 685     |     |     |
|    | Asn Leu Glu Ser Ser Lys Ile Glu Val Ile Leu Lys Asn Ala Ile Val<br>690 695 700     |     |     |
| 50 | Tyr Asn Ser Met Tyr Glu Asn Phe Ser Thr Ser Phe Trp Ile Arg Ile<br>705 710 715 720 |     |     |
|    | Pro Lys Tyr Phe Asn Ser Ile Ser Leu Asn Asn Glu Tyr Thr Ile Ile<br>725 730 735     |     |     |
| 55 | Asn Cys Met Glu Asn Asn Ser Gly Trp Lys Val Ser Leu Asn Tyr Gly<br>740 745 750     |     |     |
|    | Glu Ile Ile Trp Thr Leu Gln Asp Thr Gln Glu Ile Lys Gln Arg Val<br>755 760 765     |     |     |

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Val Phe Lys Tyr Ser Gln Met Ile Asn Ile Ser Asp Tyr Ile Asn Arg  
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 5 Trp Ile Phe Val Thr Ile Thr Asn Asn Arg Leu Asn Asn Ser Lys Ile  
 785 790 795 800  
 Tyr Ile Asn Gly Arg Leu Ile Asp Gln Lys Pro Ile Ser Asn Leu Gly  
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 10 Asn Ile His Ala Ser Asn Asn Ile Met Phe Lys Leu Asp Gly Cys Arg  
 820 825 830  
 Asp Thr His Arg Tyr Ile Trp Ile Lys Tyr Phe Asn Leu Phe Asp Lys  
 835 840 845  
 15 Glu Leu Asn Glu Lys Glu Ile Lys Asp Leu Tyr Asp Asn Gln Ser Asn  
 850 855 860  
 20 Ser Gly Ile Leu Lys Asp Phe Trp Gly Asp Tyr Leu Gln Tyr Asp Lys  
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 Pro Tyr Tyr Met Leu Asn Leu Tyr Asp Pro Asn Lys Tyr Val Asp Val  
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 Ser Val Met Thr Thr Asn Ile Tyr Leu Asn Ser Ser Leu Tyr Arg Gly  
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 930 935 940  
 35 Val Arg Asn Asn Asp Arg Val Tyr Ile Asn Val Val Val Lys Asn Lys  
 945 950 955 960  
 Glu Tyr Arg Leu Ala Thr Asn Ala Ser Gln Ala Gly Val Glu Lys Ile  
 965 970 975  
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 980 985 990  
 Val Met Lys Ser Lys Asn Asp Gln Gly Ile Thr Asn Lys Cys Lys Met  
 995 1000 1005  
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 1010 1015 1020  
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 <223> Description of Artificial Sequence:construct

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|    | Met | Pro | Phe | Glu | Leu | Pro | Ala | Leu | Pro | Tyr | Pro | Tyr | Asp | Ala | Leu | Glu |
|    | 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| 5  | Pro | His | Ile | Asp | Lys | Glu | Thr | Met | Asn | Ile | His | His | Thr | Lys | His | His |
|    |     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
|    | Asn | Thr | Tyr | Val | Thr | Asn | Leu | Asn | Ala | Ala | Leu | Glu | Gly | His | Pro | Asp |
| 10 |     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
|    | Leu | Gln | Asn | Lys | Ser | Leu | Glu | Glu | Leu | Leu | Ser | Asn | Leu | Glu | Ala | Leu |
|    |     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| 15 | Pro | Glu | Ser | Ile | Arg | Thr | Ala | Val | Arg | Asn | Asn | Gly | Gly | Gly | His | Ala |
|    | 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
|    | Asn | His | Ser | Leu | Phe | Trp | Thr | Ile | Leu | Ser | Pro | Asn | Gly | Gly | Gly | Glu |
|    |     |     |     | 85  |     |     |     |     |     | 90  |     |     |     |     | 95  |     |
| 20 | Pro | Thr | Gly | Glu | Leu | Ala | Asp | Ala | Ile | Asn | Lys | Lys | Phe | Gly | Ser | Phe |
|    |     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
|    | Thr | Ala | Phe | Lys | Asp | Glu | Phe | Ser | Lys | Ala | Ala | Ala | Gly | Arg | Phe | Gly |
| 25 |     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
|    | Ser | Gly | Trp | Ala | Trp | Leu | Val | Val | Asn | Asn | Gly | Glu | Leu | Glu | Ile | Thr |
|    |     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| 30 | Ser | Thr | Pro | Asn | Gln | Asp | Ser | Pro | Ile | Met | Glu | Gly | Lys | Thr | Pro | Ile |
|    | 145 |     |     |     | 150 |     |     |     |     |     | 155 |     |     |     |     | 160 |
|    | Leu | Gly | Leu | Asp | Val | Trp | Glu | His | Ala | Tyr | Tyr | Leu | Lys | Tyr | Gln | Asn |
|    |     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |
| 35 | Arg | Arg | Pro | Glu | Tyr | Ile | Ala | Ala | Phe | Trp | Asn | Val | Val | Asn | Trp | Asp |
|    |     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
|    | Glu | Val | Ala | Lys | Arg | Tyr | Ser | Glu | Ala | Lys | Ala | Lys | Gln | Arg | Ser | Cys |
| 40 |     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
|    | Gly | Leu | Val | Pro | Arg | Gly | Ser | Gly | Pro | Gly | Ser | Lys | Ala | Pro | Gly | Ile |
|    |     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| 45 | Cys | Ile | Asp | Val | Asp | Asn | Glu | Asp | Leu | Phe | Phe | Ile | Ala | Asp | Lys | Asn |
|    | 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
|    | Ser | Phe | Ser | Asp | Asp | Leu | Ser | Lys | Asn | Glu | Arg | Ile | Glu | Tyr | Asn | Thr |
|    |     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |
| 50 | Gln | Ser | Asn | Tyr | Ile | Glu | Asn | Asp | Phe | Pro | Ile | Asn | Glu | Leu | Ile | Leu |
|    |     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
|    | Asp | Thr | Asp | Leu | Ile | Ser | Lys | Ile | Glu | Leu | Pro | Ser | Glu | Asn | Thr | Glu |
| 55 |     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
|    | Ser | Leu | Thr | Asp | Phe | Asn | Val | Asp | Val | Pro | Val | Tyr | Glu | Lys | Gln | Pro |
|    |     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| 60 | Ala | Ile | Lys | Lys | Ile | Phe | Thr | Asp | Glu | Asn | Thr | Ile | Phe | Gln | Tyr | Leu |
|    | 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
|    | Tyr | Ser | Gln | Thr | Phe | Pro | Leu | Asp | Ile | Arg | Asp | Ile | Ser | Leu | Thr | Ser |
|    |     |     |     | 325 |     |     |     |     |     | 330 |     |     |     | 335 |     |     |
| 65 | Ser | Phe | Asp | Asp | Ala | Leu | Leu | Phe | Ser | Asn | Lys | Val | Tyr | Ser | Phe | Phe |
|    |     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |

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|    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|    | Ser | Met | Asp | Tyr | Ile | Lys | Thr | Ala | Asn | Lys | Val | Val | Glu | Ala | Gly | Leu |  |
|    |     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |  |
| 5  | Phe | Ala | Gly | Trp | Val | Lys | Gln | Ile | Val | Asn | Asp | Phe | Val | Ile | Glu | Ala |  |
|    |     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |  |
|    | Asn | Lys | Ser | Asn | Thr | Met | Asp | Lys | Ile | Ala | Asp | Ile | Ser | Leu | Ile | Val |  |
|    | 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |  |
| 10 | Pro | Tyr | Ile | Gly | Leu | Ala | Leu | Asn | Val | Gly | Asn | Glu | Thr | Ala | Lys | Gly |  |
|    |     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |  |
|    | Asn | Phe | Glu | Asn | Ala | Phe | Glu | Ile | Ala | Gly | Ala | Ser | Ile | Leu | Leu | Glu |  |
| 15 |     |     |     |     | 420 |     |     |     | 425 |     |     |     |     | 430 |     |     |  |
|    | Phe | Ile | Pro | Glu | Leu | Leu | Ile | Pro | Val | Val | Gly | Ala | Phe | Leu | Leu | Glu |  |
|    |     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |  |
| 20 | Ser | Tyr | Ile | Asp | Asn | Lys | Asn | Lys | Ile | Ile | Lys | Thr | Ile | Asp | Asn | Ala |  |
|    | 450 |     |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |  |
|    | Leu | Thr | Lys | Arg | Asn | Glu | Lys | Trp | Ser | Asp | Met | Tyr | Gly | Leu | Ile | Val |  |
|    | 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |  |
| 25 | Ala | Gln | Trp | Leu | Ser | Thr | Val | Asn | Thr | Gln | Phe | Tyr | Thr | Ile | Lys | Glu |  |
|    |     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |  |
|    | Gly | Met | Tyr | Lys | Ala | Leu | Asn | Tyr | Gln | Ala | Gln | Ala | Leu | Glu | Glu | Ile |  |
| 30 |     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |  |
|    | Ile | Lys | Tyr | Arg | Tyr | Asn | Ile | Tyr | Ser | Glu | Lys | Glu | Lys | Ser | Asn | Ile |  |
|    |     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |  |
| 35 | Asn | Ile | Asp | Phe | Asn | Asp | Ile | Asn | Ser | Lys | Leu | Asn | Glu | Gly | Ile | Asn |  |
|    |     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |  |
|    | Gln | Ala | Ile | Asp | Asn | Ile | Asn | Asn | Phe | Ile | Asn | Gly | Cys | Ser | Val | Ser |  |
|    | 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |  |
| 40 | Tyr | Leu | Met | Lys | Lys | Met | Ile | Pro | Leu | Ala | Val | Glu | Lys | Leu | Leu | Asp |  |
|    |     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |  |
|    | Phe | Asp | Asn | Thr | Leu | Lys | Lys | Asn | Leu | Leu | Asn | Tyr | Ile | Asp | Glu | Asn |  |
| 45 |     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |  |
|    | Lys | Leu | Tyr | Leu | Ile | Gly | Ser | Ala | Glu | Tyr | Glu | Lys | Ser | Lys | Val | Asn |  |
|    |     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |  |
| 50 | Lys | Tyr | Leu | Lys | Thr | Ile | Met | Pro | Phe | Asp | Leu | Ser | Ile | Tyr | Thr | Asn |  |
|    |     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |  |
|    | Asp | Thr | Ile | Leu | Ile | Glu | Met | Phe | Asn | Lys | Tyr | Asn | Ser | Glu | Ile | Leu |  |
|    | 625 |     |     |     |     | 630 |     |     |     |     | 635 |     |     |     |     | 640 |  |
| 55 | Asn | Asn | Ile | Ile | Leu | Asn | Leu | Arg | Tyr | Lys | Asp | Asn | Asn | Leu | Ile | Asp |  |
|    |     |     |     |     | 645 |     |     |     |     | 650 |     |     |     |     | 655 |     |  |
|    | Leu | Ser | Gly | Tyr | Gly | Ala | Lys | Val | Glu | Val | Tyr | Asp | Gly | Val | Glu | Leu |  |
| 60 |     |     |     | 660 |     |     |     |     | 665 |     |     |     |     | 670 |     |     |  |
|    | Asn | Asp | Lys | Asn | Gln | Phe | Lys | Leu | Thr | Ser | Ser | Ala | Asn | Ser | Lys | Ile |  |
|    |     |     | 675 |     |     |     |     | 680 |     |     |     |     | 685 |     |     |     |  |
| 65 | Arg | Val | Thr | Gln | Asn | Gln | Asn | Ile | Ile | Phe | Asn | Ser | Val | Phe | Leu | Asp |  |
|    |     | 690 |     |     |     |     | 695 |     |     |     |     | 700 |     |     |     |     |  |
|    | Phe | Ser | Val | Ser | Phe | Trp | Ile | Arg | Ile | Pro | Lys | Tyr | Lys | Asn | Asp | Gly |  |

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|    |                     |                         |                                 |  |     |      |      |
|----|---------------------|-------------------------|---------------------------------|--|-----|------|------|
|    | 705                 |                         | 710                             |  | 715 |      | 720  |
|    | Ile Gln Asn Tyr     | Ile His Asn Glu Tyr     | Thr Ile Ile Asn Cys Met Lys     |  |     |      |      |
| 5  |                     | 725                     | 730                             |  |     |      |      |
|    | Asn Asn Ser Gly     | Trp Lys Ile Ser         | Ile Arg Gly Asn Arg Ile Ile Trp |  |     |      |      |
|    |                     | 740                     | 745                             |  |     | 750  |      |
| 10 | Thr Leu Ile Asp     | Ile Asn Gly Lys         | Thr Lys Ser Val Phe Phe Glu Tyr |  |     |      |      |
|    |                     | 755                     | 760                             |  |     | 765  |      |
|    | Asn Ile Arg Glu Asp | Ile Ser Glu Tyr         | Ile Asn Arg Trp Phe Phe Val     |  |     |      |      |
|    |                     | 770                     | 775                             |  |     | 780  |      |
| 15 | Thr Ile Thr Asn Asn | Leu Asn Asn Ala Lys     | Ile Tyr Ile Asn Gly Lys         |  |     |      |      |
|    |                     | 785                     | 790                             |  |     | 795  | 800  |
|    | Leu Glu Ser Asn     | Thr Asp Ile Lys Asp     | Ile Arg Glu Val Ile Ala Asn     |  |     |      |      |
| 20 |                     | 805                     | 810                             |  |     | 815  |      |
|    | Gly Glu Ile Ile     | Phe Lys Leu Asp         | Gly Asp Ile Asp Arg Thr Gln Phe |  |     |      |      |
|    |                     | 820                     | 825                             |  |     | 830  |      |
| 25 | Ile Trp Met Lys     | Tyr Phe Ser Ile         | Phe Asn Thr Glu Leu Ser Gln Ser |  |     |      |      |
|    |                     | 835                     | 840                             |  |     | 845  |      |
|    | Asn Ile Glu Glu Arg | Tyr Lys Ile Gln Ser Tyr | Ser Glu Tyr Leu Lys             |  |     |      |      |
|    |                     | 850                     | 855                             |  |     | 860  |      |
| 30 | Asp Phe Trp Gly     | Asn Pro Leu Met Tyr     | Asn Lys Glu Tyr Tyr Met Phe     |  |     |      |      |
|    |                     | 865                     | 870                             |  |     | 875  | 880  |
|    | Asn Ala Gly Asn     | Lys Asn Ser Tyr Ile     | Lys Leu Lys Lys Asp Ser Pro     |  |     |      |      |
| 35 |                     | 885                     | 890                             |  |     | 895  |      |
|    | Val Gly Glu Ile     | Leu Thr Arg Ser         | Lys Tyr Asn Gln Asn Ser Lys Tyr |  |     |      |      |
|    |                     | 900                     | 905                             |  |     | 910  |      |
| 40 | Ile Asn Tyr Arg     | Asp Leu Tyr Ile         | Gly Glu Lys Phe Ile Ile Arg Arg |  |     |      |      |
|    |                     | 915                     | 920                             |  |     | 925  |      |
|    | Lys Ser Asn Ser     | Gln Ser Ile Asn Asp Asp | Ile Val Arg Lys Glu Asp         |  |     |      |      |
|    |                     | 930                     | 935                             |  |     | 940  |      |
| 45 | Tyr Ile Tyr Leu Asp | Phe Phe Asn Leu Asn     | Gln Glu Trp Arg Val Tyr         |  |     |      |      |
|    |                     | 945                     | 950                             |  |     | 955  | 960  |
|    | Thr Tyr Lys Tyr     | Phe Lys Lys Glu Glu     | Glu Lys Leu Phe Leu Ala Pro     |  |     |      |      |
| 50 |                     | 965                     | 970                             |  |     | 975  |      |
|    | Ile Ser Asp Ser     | Asp Glu Phe Tyr         | Asn Thr Ile Gln Ile Lys Glu Tyr |  |     |      |      |
|    |                     | 980                     | 985                             |  |     | 990  |      |
| 55 | Asp Glu Gln Pro     | Thr Tyr Ser Cys         | Gln Leu Leu Phe Lys Lys Asp Glu |  |     |      |      |
|    |                     | 995                     | 1000                            |  |     | 1005 |      |
|    | Glu Ser Thr Asp     | Glu Ile Gly Leu Ile     | Gly Ile His Arg Phe Tyr Glu     |  |     |      |      |
|    |                     | 1010                    | 1015                            |  |     | 1020 |      |
| 60 | Ser Gly Ile Val     | Phe Glu Glu Tyr         | Lys Asp Tyr Phe Cys Ile Ser Lys |  |     |      |      |
|    |                     | 1025                    | 1030                            |  |     | 1035 | 1040 |
|    | Trp Tyr Leu Lys     | Glu Val Lys Arg         | Lys Pro Tyr Asn Leu Lys Leu Gly |  |     |      |      |
|    |                     | 1045                    | 1050                            |  |     | 1055 |      |
| 65 | Cys Asn Trp Gln     | Phe Ile Pro Lys Asp     | Glu Gly Trp Thr Glu             |  |     |      |      |
|    |                     | 1060                    | 1065                            |  |     | 1070 |      |



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5 <210> 5  
 <211> 1059  
 <212> PRT  
 <213> Artificial Sequence

10 <220>  
 <223> Description of Artificial Sequence:construct

<400> 5  
 Met Pro Phe Glu Leu Pro Ala Leu Pro Tyr Pro Tyr Asp Ala Leu Glu  
 1 5 10 15  
 15 Pro His Ile Asp Lys Glu Thr Met Asn Ile His His Thr Lys His His  
 20 20 25 30  
 Asn Thr Tyr Val Thr Asn Leu Asn Ala Ala Leu Glu Gly His Pro Asp  
 35 40 45  
 20 Leu Gln Asn Lys Ser Leu Glu Glu Leu Leu Ser Asn Leu Glu Ala Leu  
 50 55 60  
 25 Pro Glu Ser Ile Arg Thr Ala Val Arg Asn Asn Gly Gly Gly His Ala  
 65 70 75 80  
 Asn His Ser Leu Phe Trp Thr Ile Leu Ser Pro Asn Gly Gly Gly Glu  
 85 90 95  
 30 Pro Thr Gly Glu Leu Ala Asp Ala Ile Asn Lys Lys Phe Gly Ser Phe  
 100 105 110  
 Thr Ala Phe Lys Asp Glu Phe Ser Lys Ala Ala Ala Gly Arg Phe Gly  
 115 120 125  
 35 Ser Gly Trp Ala Trp Leu Val Val Asn Asn Gly Glu Leu Glu Ile Thr  
 130 135 140  
 40 Ser Thr Pro Asn Gln Asp Ser Pro Ile Met Glu Gly Lys Thr Pro Ile  
 145 150 155 160  
 Leu Gly Leu Asp Val Trp Glu His Ala Tyr Tyr Leu Lys Tyr Gln Asn  
 165 170 175  
 45 Arg Arg Pro Glu Tyr Ile Ala Ala Phe Trp Asn Val Val Asn Trp Asp  
 180 185 190  
 Glu Val Ala Lys Arg Tyr Ser Glu Ala Lys Ala Lys Gln Arg Ser Cys  
 195 200 205  
 Gly Leu Val Pro Arg Gly Ser Gly Pro Gly Ser Lys Ala Pro Pro Arg  
 210 215 220  
 Leu Cys Ile Arg Val Asn Asn Arg Glu Leu Phe Phe Val Ala Ser Glu  
 225 230 235 240  
 Ser Ser Tyr Asn Glu Asn Asp Ile Asn Thr Pro Lys Glu Ile Asp Asp  
 245 250 255  
 Thr Thr Asn Leu Asn Asn Asn Tyr Arg Asn Asn Leu Asp Glu Val Ile  
 260 265 270  
 Leu Asp Tyr Asn Ser Glu Thr Ile Pro Gln Ile Ser Asn Gln Thr Leu  
 275 280 285  
 sn Thr Leu Val Gln Asp Asp Ser Tyr Val Pro Arg Tyr Asp Ser Asn  
 290 295 300

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Gly Thr Ser Glu Ile Glu Glu His Asn Val Val Asp Leu Asn Val Phe  
 305 310 315 320  
 5 Phe Tyr Leu His Ala Gln Lys Val Pro Glu Gly Glu Thr Asn Ile Ser  
 325 330 335  
 Leu Thr Ser Ser Ile Asp Thr Ala Leu Ser Glu Glu Ser Gln Val Tyr  
 340 345 350  
 10 Thr Phe Phe Ser Ser Glu Phe Ile Asn Thr Ile Asn Lys Pro Val His  
 355 360 365  
 15 Ala Ala Leu Phe Ile Ser Trp Ile Asn Gln Val Ile Arg Asp Phe Thr  
 370 375 380  
 Thr Glu Ala Thr Gln Lys Ser Thr Phe Asp Lys Ile Ala Asp Ile Ser  
 385 390 395 400  
 20 Leu Val Val Pro Tyr Val Gly Leu Ala Leu Asn Ile Gly Asn Glu Val  
 405 410 415  
 Gln Lys Glu Asn Phe Lys Glu Ala Phe Glu Leu Leu Gly Ala Gly Ile  
 420 425 430  
 25 Leu Leu Glu Phe Val Pro Glu Leu Leu Ile Pro Thr Ile Leu Val Phe  
 435 440 445  
 30 Thr Ile Lys Ser Phe Ile Gly Ser Ser Glu Asn Lys Asn Lys Ile Ile  
 450 455 460  
 Lys Ala Ile Asn Asn Ser Leu Met Glu Arg Glu Thr Lys Trp Lys Glu  
 465 470 475 480  
 35 Ile Tyr Ser Trp Ile Val Ser Asn Trp Leu Thr Arg Ile Asn Thr Gln  
 485 490 495  
 Phe Asn Lys Arg Lys Glu Gln Met Tyr Gln Ala Leu Gln Asn Gln Val  
 500 505 510  
 40 Asp Ala Ile Lys Thr Val Ile Glu Tyr Lys Tyr Asn Asn Tyr Thr Ser  
 515 520 525  
 Asp Glu Arg Asn Arg Leu Glu Ser Glu Tyr Asn Ile Asn Asn Ile Arg  
 530 535 540  
 45 Glu Glu Leu Asn Lys Lys Val Ser Leu Ala Met Glu Asn Ile Glu Arg  
 545 550 555 560  
 50 Phe Ile Thr Glu Ser Ser Ile Phe Tyr Leu Met Lys Leu Ile Asn Glu  
 565 570 575  
 Ala Lys Val Ser Lys Leu Arg Glu Tyr Asp Glu Gly Val Lys Glu Tyr  
 580 585 590  
 55 Leu Leu Asp Tyr Ile Ser Glu His Arg Ser Ile Leu Gly Asn Ser Val  
 595 600 605  
 60 Gln Glu Leu Asn Asp Leu Val Thr Ser Thr Leu Asn Asn Ser Ile Pro  
 610 615 620  
 Phe Glu Leu Ser Ser Tyr Thr Asn Asp Lys Ile Leu Ile Leu Tyr Phe  
 625 630 635 640  
 65 Asn Lys Leu Tyr Lys Lys Ile Lys Asp Asn Ser Ile Leu Asp Met Arg  
 645 650 655  
 Tyr Glu Asn Asn Lys Phe Ile Asp Ile Ser Gly Tyr Gly Ser Asn Ile

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|    |  |     |     |
|----|--|-----|-----|
|    | 660  | 665 | 670 |
| 5  | Ser Ile Asn Gly Asp Val Tyr Ile Tyr Ser Thr Asn Arg Asn Gln Phe<br>675 680 685     |     |     |
|    | Gly Ile Tyr Ser Ser Lys Pro Ser Glu Val Asn Ile Ala Gln Asn Asn<br>690 695 700     |     |     |
| 10 | Asp Ile Ile Tyr Asn Gly Arg Tyr Gln Asn Phe Ser Ile Ser Phe Trp<br>705 710 715 720 |     |     |
|    | Val Arg Ile Pro Lys Tyr Phe Asn Lys Val Asn Leu Asn Asn Glu Tyr<br>725 730 735     |     |     |
| 15 | Thr Ile Ile Asp Cys Ile Arg Asn Asn Asn Ser Gly Trp Lys Ile Ser<br>740 745 750     |     |     |
|    | Leu Asn Tyr Asn Lys Ile Ile Trp Thr Leu Gln Asp Thr Ala Gly Asn<br>755 760 765     |     |     |
| 20 | Asn Gln Lys Leu Val Phe Asn Tyr Thr Gln Met Ile Ser Ile Ser Asp<br>770 775 780     |     |     |
|    | Tyr Ile Asn Lys Trp Ile Phe Val Thr Ile Thr Asn Asn Arg Leu Gly<br>785 790 795 800 |     |     |
| 25 | Asn Ser Arg Ile Tyr Ile Asn Gly Asn Leu Ile Asp Glu Lys Ser Ile<br>805 810 815     |     |     |
| 30 | Ser Asn Leu Gly Asp Ile His Val Ser Asp Asn Ile Leu Phe Lys Ile<br>820 825 830     |     |     |
|    | Val Gly Cys Asn Asp Thr Arg Tyr Val Gly Ile Arg Tyr Phe Lys Val<br>835 840 845     |     |     |
| 35 | Phe Asp Thr Glu Leu Gly Lys Thr Glu Ile Glu Thr Leu Tyr Ser Asp<br>850 855 860     |     |     |
| 40 | Glu Pro Asp Pro Ser Ile Leu Lys Asp Phe Trp Gly Asn Tyr Leu Leu<br>865 870 875 880 |     |     |
|    | Tyr Asn Lys Arg Tyr Tyr Leu Leu Asn Leu Leu Arg Thr Asp Lys Ser<br>885 890 895     |     |     |
| 45 | Ile Thr Gln Asn Ser Asn Phe Leu Asn Ile Asn Gln Gln Arg Gly Val<br>900 905 910     |     |     |
|    | Tyr Gln Lys Pro Asn Ile Phe Ser Asn Thr Arg Leu Tyr Thr Gly Val<br>915 920 925     |     |     |
| 50 | Glu Val Ile Ile Arg Lys Asn Gly Ser Thr Asp Ile Ser Asn Thr Asp<br>930 935 940     |     |     |
| 55 | Asn Phe Val Arg Lys Asn Asp Leu Ala Tyr Ile Asn Val Val Asp Arg<br>945 950 955 960 |     |     |
|    | Asp Val Glu Tyr Arg Leu Tyr Ala Asp Ile Ser Ile Ala Lys Pro Glu<br>965 970 975     |     |     |
| 60 | Lys Ile Ile Lys Leu Ile Arg Thr Ser Asn Ser Asn Asn Ser Leu Gly<br>980 985 990     |     |     |
|    | Gln Ile Ile Val Met Asp Ser Ile Gly Asn Asn Cys Thr Met Asn Phe<br>995 1000 1005   |     |     |
| 65 | Gln Asn Asn Asn Gly Gly Asn Ile Gly Leu Leu Gly Phe His Ser Asn<br>1010 1015 1020  |     |     |

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Asn Leu Val Ala Ser Ser Trp Tyr Tyr Asn Asn Ile Arg Lys Asn Thr  
 1025 1030 1035 1040

Ser Ser Asn Gly Cys Phe Trp Ser Phe Ile Ser Lys Glu His Gly Trp  
 1045 1050 1055

Gln Glu Asn

<210> 6

<211> 1092

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:construct

<400> 6

Met Leu Ser Arg Ala Val Cys Gly Thr Ser Arg Gln Leu Ala Pro Ala  
 1 5 10 15

Leu Gly Tyr Leu Gly Ser Arg Gln Lys His Ser Arg Gly Ser Pro Ala  
 20 25 30

Leu Pro Tyr Pro Tyr Asp Ala Leu Glu Pro His Ile Asp Lys Glu Thr  
 35 40 45

Met Asn Ile His His Thr Lys His His Asn Thr Tyr Val Thr Asn Leu  
 50 55 60

Asn Ala Ala Leu Glu Gly His Pro Asp Leu Gln Asn Lys Ser Leu Glu  
 65 70 75 80

Glu Leu Leu Ser Asn Leu Glu Ala Leu Pro Glu Ser Ile Arg Thr Ala  
 85 90 95

Val Arg Asn Asn Gly Gly Gly His Ala Asn His Ser Leu Phe Trp Thr  
 100 105 110

Ile Leu Ser Pro Asn Gly Gly Gly Glu Pro Thr Gly Glu Leu Ala Asp  
 115 120 125

Ala Ile Asn Lys Lys Phe Gly Ser Phe Thr Ala Phe Lys Asp Glu Phe  
 130 135 140

Ser Lys Ala Ala Ala Gly Arg Phe Gly Ser Gly Trp Ala Trp Leu Val  
 145 150 155 160

Val Asn Asn Gly Glu Leu Glu Ile Thr Ser Thr Pro Asn Gln Asp Ser  
 165 170 175

Pro Ile Met Glu Gly Lys Thr Pro Ile Leu Gly Leu Asp Val Trp Glu  
 180 185 190

His Ala Tyr Tyr Leu Lys Tyr Gln Asn Arg Arg Pro Glu Tyr Ile Ala  
 195 200 205

Ala Phe Trp Asn Val Val Asn Trp Asp Glu Val Ala Lys Arg Tyr Ser  
 210 215 220

Glu Ala Lys Ala Lys Gln Arg Ser Cys Gly Leu Val Pro Arg Gly Ser  
 225 230 235 240

Gly Pro Gly Ser Ala Leu Asn Asp Leu Cys Ile Lys Val Asn Asn Trp  
 245 250 255

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|    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|    | Asp | Leu | Phe | Phe | Ser | Pro | Ser | Glu | Asp | Asn | Phe | Thr | Asn | Asp | Leu | Asn |
|    |     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| 5  | Lys | Gly | Glu | Glu | Ile | Thr | Ser | Asp | Thr | Asn | Ile | Glu | Ala | Ala | Glu | Glu |
|    |     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
|    | Asn | Ile | Ser | Leu | Asp | Leu | Ile | Gln | Gln | Tyr | Tyr | Leu | Thr | Phe | Asn | Phe |
|    |     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| 10 | Asp | Asn | Glu | Pro | Glu | Asn | Ile | Ser | Ile | Glu | Asn | Leu | Ser | Ser | Asp | Ile |
|    | 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
|    | Ile | Gly | Gln | Leu | Glu | Leu | Met | Pro | Asn | Ile | Glu | Arg | Phe | Pro | Asn | Gly |
|    |     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| 15 | Lys | Lys | Tyr | Glu | Leu | Asp | Lys | Tyr | Thr | Met | Phe | His | Tyr | Leu | Arg | Ala |
|    |     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
|    | Gln | Glu | Phe | Glu | His | Gly | Lys | Ser | Arg | Ile | Ala | Leu | Thr | Asn | Ser | Val |
| 20 |     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
|    | Asn | Glu | Ala | Leu | Leu | Asn | Pro | Ser | Arg | Val | Tyr | Thr | Phe | Phe | Ser | Ser |
|    |     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| 25 | Asp | Tyr | Val | Lys | Lys | Val | Asn | Lys | Ala | Thr | Glu | Ala | Ala | Met | Phe | Leu |
|    | 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
|    | Gly | Trp | Val | Glu | Gln | Leu | Val | Tyr | Asp | Phe | Thr | Asp | Glu | Thr | Ser | Glu |
| 30 |     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
|    | Val | Ser | Thr | Thr | Asp | Lys | Ile | Ala | Asp | Ile | Thr | Ile | Ile | Ile | Pro | Tyr |
|    |     |     |     | 420 |     |     |     |     | 425 |     |     |     |     |     | 430 |     |
| 35 | Ile | Gly | Pro | Ala | Leu | Asn | Ile | Gly | Asn | Met | Leu | Tyr | Lys | Asp | Asp | Phe |
|    |     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
|    | Val | Gly | Ala | Leu | Ile | Phe | Ser | Gly | Ala | Val | Ile | Leu | Leu | Glu | Phe | Ile |
|    |     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| 40 | Pro | Glu | Ile | Ala | Ile | Pro | Val | Leu | Gly | Thr | Phe | Ala | Leu | Val | Ser | Tyr |
|    | 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
|    | Ile | Ala | Asn | Lys | Val | Leu | Thr | Val | Gln | Thr | Ile | Asp | Asn | Ala | Leu | Ser |
| 45 |     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
|    | Lys | Arg | Asn | Glu | Lys | Trp | Asp | Glu | Val | Tyr | Lys | Tyr | Ile | Val | Thr | Asn |
|    |     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
| 50 | Trp | Leu | Ala | Lys | Val | Asn | Thr | Gln | Ile | Asp | Leu | Ile | Arg | Lys | Lys | Met |
|    |     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |
|    | Lys | Glu | Ala | Leu | Glu | Asn | Gln | Ala | Glu | Ala | Thr | Lys | Ala | Ile | Ile | Asn |
|    |     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| 55 | Tyr | Gln | Tyr | Asn | Gln | Tyr | Thr | Glu | Glu | Glu | Lys | Asn | Asn | Ile | Asn | Phe |
|    | 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |
|    | Asn | Ile | Asp | Asp | Leu | Ser | Ser | Lys | Leu | Asn | Glu | Ser | Ile | Asn | Lys | Ala |
| 60 |     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |
|    | Met | Ile | Asn | Ile | Asn | Lys | Phe | Leu | Asn | Gln | Cys | Ser | Val | Ser | Tyr | Leu |
|    |     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |
| 65 | Met | Asn | Ser | Met | Ile | Pro | Tyr | Gly | Val | Lys | Arg | Leu | Glu | Asp | Phe | Asp |
|    |     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |
|    | Ala | Ser | Leu | Lys | Asp | Ala | Leu | Leu | Lys | Tyr | Ile | Tyr | Asp | Asn | Arg | Gly |

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|    | 610             | 615                             | 620                         |
|----|-----------------|---------------------------------|-----------------------------|
| 5  | Thr 625         | Leu Ile Gly Gln Val 630         | Asp Arg Leu Lys Asp 635     |
|    | Leu Ser Thr     | Asp Ile 645                     | Pro Phe Gln Leu Ser 650     |
| 10 | Arg Leu Leu     | Ser Thr Phe Thr Glu Tyr 665     | Ile Lys Asn Ile 670         |
|    | Ser Ile 675     | Leu Asn Leu Arg Tyr Glu 680     | Asn His Leu Ile 685         |
| 15 | Arg Tyr 690     | Ala Ser Lys Ile Asn 695         | Ile Gly Ser Lys Val 700     |
| 20 | Ile 705         | Asp Lys Asn Gln Ile 710         | Gln Leu Phe Asn Leu 715     |
|    | Glu Val Ile Leu | Lys Asn Ala Ile Val Tyr 730     | Asn Ser Met Tyr Glu 735     |
| 25 | Phe Ser Thr 740 | Ser Phe Trp Ile Arg Ile 745     | Pro Lys Tyr Phe Asn 750     |
|    | Ser Leu 755     | Asn Asn Glu Tyr Thr Ile 760     | Asn Cys Met Glu 765         |
| 30 | Gly Trp 770     | Lys Val Ser Leu Asn Tyr Gly 775 | Glu Ile Ile Trp Thr Leu Gln |
| 35 | Asp 785         | Thr Gln Glu Ile Lys 790         | Gln Arg Val Val Phe 795     |
|    | Ile Asn Ile Ser | Asp Tyr Ile Asn Arg Trp 810     | Ile Phe Val Thr Ile 815     |
| 40 | Asn Asn Arg 820 | Leu Asn Asn Ser Lys Ile 825     | Tyr Ile Asn Gly Arg 830     |
|    | Asp Gln Lys 835 | Pro Ile Ser Asn Leu Gly 840     | Asn Ile His Ala Ser 845     |
| 45 | Ile Met 850     | Phe Lys Leu Asp Gly 855         | Cys Arg Asp Thr His 860     |
| 50 | Ile 865         | Lys Tyr Phe Asn Leu Phe 870     | Asp Lys Glu Leu Asn 875     |
|    | Lys Asp Leu Tyr | Asp Asn Gln Ser Asn Ser 890     | Gly Ile Leu Lys Asp 895     |
| 55 | Trp Gly Asp 900 | Tyr Leu Gln Tyr Asp Lys 905     | Pro Tyr Tyr Met Leu 910     |
|    | Tyr Asp 915     | Pro Asn Lys Tyr Val Asp 920     | Val Asn Asn Val Gly 925     |
| 60 | Tyr Met 930     | Tyr Leu Lys Gly Pro 935         | Arg Gly Ser Val Met 940     |
| 65 | Tyr 945         | Leu Asn Ser Ser Leu 950         | Tyr Arg Gly Thr Lys 955     |
|    | Tyr Ala Ser Gly | Asn Lys Asp Asn Ile Val 970     | Arg Asn Asn Asp Arg 975     |

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Tyr Ile Asn Val Val Lys Asn Lys Glu Tyr Arg Leu Ala Thr Asn
      980                                985                                990
5  Ala Ser Gln Ala Gly Val Glu Lys Ile Leu Ser Ala Leu Glu Ile Pro
      995                                1000                                1005
    Asp Val Gly Asn Leu Ser Gln Val Val Val Met Lys Ser Lys Asn Asp
      1010                                1015                                1020
10  Gln Gly Ile Thr Asn Lys Cys Lys Met Asn Leu Gln Asp Asn Asn Gly
      1025                                1030                                1035                                1040
    Asn Asp Ile Gly Phe Ile Gly Phe His Gln Phe Asn Asn Ile Ala Lys
      1045                                1050                                1055
15  Leu Val Ala Ser Asn Trp Tyr Asn Arg Gln Ile Glu Arg Ser Ser Arg
      1060                                1065                                1070
    Thr Leu Gly Cys Ser Trp Glu Phe Ile Pro Val Asp Asp Gly Trp Gly
      1075                                1080                                1085
    Glu Arg Pro Leu
      1090
25
    <210> 7
    <211> 1095
    <212> PRT
    <213> Artificial Sequence
30
    <220>
    <223> Description of Artificial Sequence:construct
35
    <400> 7
    Met Leu Ser Arg Ala Val Cys Gly Thr Ser Arg Gln Leu Ala Pro Ala
      1          5          10          15
40  Leu Gly Tyr Leu Gly Ser Arg Gln Lys His Ser Arg Gly Ser Pro Ala
      20          25          30
    Leu Pro Tyr Pro Tyr Asp Ala Leu Glu Pro His Ile Asp Lys Glu Thr
      35          40          45
45  Met Asn Ile His His Thr Lys His His Asn Thr Tyr Val Thr Asn Leu
      50          55          60
    Asn Ala Ala Leu Glu Gly His Pro Asp Leu Gln Asn Lys Ser Leu Glu
      65          70          75          80
50  Glu Leu Leu Ser Asn Leu Glu Ala Leu Pro Glu Ser Ile Arg Thr Ala
      85          90          95
55  Val Arg Asn Asn Gly Gly Gly His Ala Asn His Ser Leu Phe Trp Thr
      100          105          110
    Ile Leu Ser Pro Asn Gly Gly Gly Glu Pro Thr Gly Glu Leu Ala Asp
      115          120          125
60  Ala Ile Asn Lys Lys Phe Gly Ser Phe Thr Ala Phe Lys Asp Glu Phe
      130          135          140
    Ser Lys Ala Ala Ala Gly Arg Phe Gly Ser Gly Trp Ala Trp Leu Val
      145          150          155          160
65  Val Asn Asn Gly Glu Leu Glu Ile Thr Ser Thr Pro Asn Gln Asp Ser
      165          170          175

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|    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|    | Pro | Ile | Met | Glu | Gly | Lys | Thr | Pro | Ile | Leu | Gly | Leu | Asp | Val | Trp | Glu |
|    |     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| 5  | His | Ala | Tyr | Tyr | Leu | Lys | Tyr | Gln | Asn | Arg | Arg | Pro | Glu | Tyr | Ile | Ala |
|    |     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
|    | Ala | Phe | Trp | Asn | Val | Val | Asn | Trp | Asp | Glu | Val | Ala | Lys | Arg | Tyr | Ser |
|    |     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| 10 | Glu | Ala | Lys | Ala | Lys | Gln | Arg | Ser | Cys | Gly | Leu | Val | Pro | Arg | Gly | Ser |
|    | 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
|    | Gly | Pro | Gly | Ser | Lys | Ala | Pro | Gly | Ile | Cys | Ile | Asp | Val | Asp | Asn | Glu |
|    |     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| 15 | Asp | Leu | Phe | Phe | Ile | Ala | Asp | Lys | Asn | Ser | Phe | Ser | Asp | Asp | Leu | Ser |
|    |     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| 20 | Lys | Asn | Glu | Arg | Ile | Glu | Tyr | Asn | Thr | Gln | Ser | Asn | Tyr | Ile | Glu | Asn |
|    |     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
|    | Asp | Phe | Pro | Ile | Asn | Glu | Leu | Ile | Leu | Asp | Thr | Asp | Leu | Ile | Ser | Lys |
|    |     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| 25 | Ile | Glu | Leu | Pro | Ser | Glu | Asn | Thr | Glu | Ser | Leu | Thr | Asp | Phe | Asn | Val |
|    | 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
|    | Asp | Val | Pro | Val | Tyr | Glu | Lys | Gln | Pro | Ala | Ile | Lys | Lys | Ile | Phe | Thr |
|    |     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| 30 | Asp | Glu | Asn | Thr | Ile | Phe | Gln | Tyr | Leu | Tyr | Ser | Gln | Thr | Phe | Pro | Leu |
|    |     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| 35 | Asp | Ile | Arg | Asp | Ile | Ser | Leu | Thr | Ser | Ser | Phe | Asp | Asp | Ala | Leu | Leu |
|    |     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
|    | Phe | Ser | Asn | Lys | Val | Tyr | Ser | Phe | Phe | Ser | Met | Asp | Tyr | Ile | Lys | Thr |
|    |     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| 40 | Ala | Asn | Lys | Val | Val | Glu | Ala | Gly | Leu | Phe | Ala | Gly | Trp | Val | Lys | Gln |
|    | 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
|    | Ile | Val | Asn | Asp | Phe | Val | Ile | Glu | Ala | Asn | Lys | Ser | Asn | Thr | Met | Asp |
|    |     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
| 45 | Lys | Ile | Ala | Asp | Ile | Ser | Leu | Ile | Val | Pro | Tyr | Ile | Gly | Leu | Ala | Leu |
|    |     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| 50 | Asn | Val | Gly | Asn | Glu | Thr | Ala | Lys | Gly | Asn | Phe | Glu | Asn | Ala | Phe | Glu |
|    |     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
|    | Ile | Ala | Gly | Ala | Ser | Ile | Leu | Leu | Glu | Phe | Ile | Pro | Glu | Leu | Leu | Ile |
|    |     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| 55 | Pro | Val | Val | Gly | Ala | Phe | Leu | Leu | Glu | Ser | Tyr | Ile | Asp | Asn | Lys | Asn |
|    | 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
|    | Lys | Ile | Ile | Lys | Thr | Ile | Asp | Asn | Ala | Leu | Thr | Lys | Arg | Asn | Glu | Lys |
|    |     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
| 60 | Trp | Ser | Asp | Met | Tyr | Gly | Leu | Ile | Val | Ala | Gln | Trp | Leu | Ser | Thr | Val |
|    |     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
|    | Asn | Thr | Gln | Phe | Tyr | Thr | Ile | Lys | Glu | Gly | Met | Tyr | Lys | Ala | Leu | Asn |
|    |     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |
| 65 | Tyr | Gln | Ala | Gln | Ala | Leu | Glu | Glu | Ile | Ile | Lys | Tyr | Arg | Tyr | Asn | Ile |



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|    | 530  | 535 | 540 |
|----|--|-----|-----|
| 5  | Tyr Ser Glu Lys Glu Lys Ser Asn Ile Asn Ile Asp Phe Asn Asp Ile<br>545 550 555 560 |     |     |
|    | Asn Ser Lys Leu Asn Glu Gly Ile Asn Gln Ala Ile Asp Asn Ile Asn<br>565 570 575     |     |     |
| 10 | Asn Phe Ile Asn Gly Cys Ser Val Ser Tyr Leu Met Lys Lys Met Ile<br>580 585 590     |     |     |
|    | Pro Leu Ala Val Glu Lys Leu Leu Asp Phe Asp Asn Thr Leu Lys Lys<br>595 600 605     |     |     |
| 15 | Asn Leu Leu Asn Tyr Ile Asp Glu Asn Lys Leu Tyr Leu Ile Gly Ser<br>610 615 620     |     |     |
| 20 | Ala Glu Tyr Glu Lys Ser Lys Val Asn Lys Tyr Leu Lys Thr Ile Met<br>625 630 635 640 |     |     |
|    | Pro Phe Asp Leu Ser Ile Tyr Thr Asn Asp Thr Ile Leu Ile Glu Met<br>645 650 655     |     |     |
| 25 | Phe Asn Lys Tyr Asn Ser Glu Ile Leu Asn Asn Ile Ile Leu Asn Leu<br>660 665 670     |     |     |
|    | Arg Tyr Lys Asp Asn Asn Leu Ile Asp Leu Ser Gly Tyr Gly Ala Lys<br>675 680 685     |     |     |
| 30 | Val Glu Val Tyr Asp Gly Val Glu Leu Asn Asp Lys Asn Gln Phe Lys<br>690 695 700     |     |     |
| 35 | Leu Thr Ser Ser Ala Asn Ser Lys Ile Arg Val Thr Gln Asn Gln Asn<br>705 710 715 720 |     |     |
|    | Ile Ile Phe Asn Ser Val Phe Leu Asp Phe Ser Val Ser Phe Trp Ile<br>725 730 735     |     |     |
| 40 | Arg Ile Pro Lys Tyr Lys Asn Asp Gly Ile Gln Asn Tyr Ile His Asn<br>740 745 750     |     |     |
|    | Glu Tyr Thr Ile Ile Asn Cys Met Lys Asn Asn Ser Gly Trp Lys Ile<br>755 760 765     |     |     |
| 45 | Ser Ile Arg Gly Asn Arg Ile Ile Trp Thr Leu Ile Asp Ile Asn Gly<br>770 775 780     |     |     |
| 50 | Lys Thr Lys Ser Val Phe Phe Glu Tyr Asn Ile Arg Glu Asp Ile Ser<br>785 790 795 800 |     |     |
|    | Glu Tyr Ile Asn Arg Trp Phe Phe Val Thr Ile Thr Asn Asn Leu Asn<br>805 810 815     |     |     |
| 55 | Asn Ala Lys Ile Tyr Ile Asn Gly Lys Leu Glu Ser Asn Thr Asp Ile<br>820 825 830     |     |     |
|    | Lys Asp Ile Arg Glu Val Ile Ala Asn Gly Glu Ile Ile Phe Lys Leu<br>835 840 845     |     |     |
| 60 | Asp Gly Asp Ile Asp Arg Thr Gln Phe Ile Trp Met Lys Tyr Phe Ser<br>850 855 860     |     |     |
| 65 | Ile Phe Asn Thr Glu Leu Ser Gln Ser Asn Ile Glu Glu Arg Tyr Lys<br>865 870 875 880 |     |     |
|    | Ile Gln Ser Tyr Ser Glu Tyr Leu Lys Asp Phe Trp Gly Asn Pro Leu<br>885 890 895     |     |     |

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5 Met Tyr Asn Lys Glu Tyr Tyr Met Phe Asn Ala Gly Asn Lys Asn Ser  
                   900                                  905                                  910  
 Tyr Ile Lys Leu Lys Lys Asp Ser Pro Val Gly Glu Ile Leu Thr Arg  
                   915                                  920                                  925  
 Ser Lys Tyr Asn Gln Asn Ser Lys Tyr Ile Asn Tyr Arg Asp Leu Tyr  
                   930                                  935                                  940  
 10 Ile Gly Glu Lys Phe Ile Ile Arg Arg Lys Ser Asn Ser Gln Ser Ile  
       945                                  950                                  955                                  960  
 Asn Asp Asp Ile Val Arg Lys Glu Asp Tyr Ile Tyr Leu Asp Phe Phe  
                                   965                                  970                                  975  
 15 Asn Leu Asn Gln Glu Trp Arg Val Tyr Thr Tyr Lys Tyr Phe Lys Lys  
                                   980                                  985                                  990  
 20 Glu Glu Glu Lys Leu Phe Leu Ala Pro Ile Ser Asp Ser Asp Glu Phe  
                   995                                  1000                                  1005  
 Tyr Asn Thr Ile Gln Ile Lys Glu Tyr Asp Glu Gln Pro Thr Tyr Ser  
       1010                                  1015                                  1020  
 25 Cys Gln Leu Leu Phe Lys Lys Asp Glu Glu Ser Thr Asp Glu Ile Gly  
       1025                                  1030                                  1035                                  1040  
 Leu Ile Gly Ile His Arg Phe Tyr Glu Ser Gly Ile Val Phe Glu Glu  
                                   1045                                  1050                                  1055  
 30 Tyr Lys Asp Tyr Phe Cys Ile Ser Lys Trp Tyr Leu Lys Glu Val Lys  
                   1060                                  1065                                  1070  
 35 Arg Lys Pro Tyr Asn Leu Lys Leu Gly Cys Asn Trp Gln Phe Ile Pro  
                   1075                                  1080                                  1085  
 Lys Asp Glu Gly Trp Thr Glu  
       1090                                  1095  
 40  
 <210> 8  
 <211> 1084  
 <212> PRT  
 45 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence:construct  
 50 <400> 8  
 Met Leu Ser Arg Ala Val Cys Gly Thr Ser Arg Gln Leu Ala Pro Ala  
       1                                  5                                  10                                  15  
 55 Leu Gly Tyr Leu Gly Ser Arg Gln Lys His Ser Arg Gly Ser Pro Ala  
                   20                                  25                                  30  
 Leu Pro Tyr Pro Tyr Asp Ala Leu Glu Pro His Ile Asp Lys Glu Thr  
                   35                                  40                                  45  
 60 Met Asn Ile His His Thr Lys His His Asn Thr Tyr Val Thr Asn Leu  
                   50                                  55                                  60  
 Asn Ala Ala Leu Glu Gly His Pro Asp Leu Gln Asn Lys Ser Leu Glu  
       65                                  70                                  75                                  80  
 65 Glu Leu Leu Ser Asn Leu Glu Ala Leu Pro Glu Ser Ile Arg Thr Ala  
                                   85                                  90                                  95

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|    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|    | Val | Arg | Asn | Asn | Gly | Gly | Gly | His | Ala | Asn | His | Ser | Leu | Phe | Trp | Thr |
|    |     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| 5  | Ile | Leu | Ser | Pro | Asn | Gly | Gly | Gly | Glu | Pro | Thr | Gly | Glu | Leu | Ala | Asp |
|    |     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
|    | Ala | Ile | Asn | Lys | Lys | Phe | Gly | Ser | Phe | Thr | Ala | Phe | Lys | Asp | Glu | Phe |
|    |     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| 10 | Ser | Lys | Ala | Ala | Ala | Gly | Arg | Phe | Gly | Ser | Gly | Trp | Ala | Trp | Leu | Val |
|    | 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
|    | Val | Asn | Asn | Gly | Glu | Leu | Glu | Ile | Thr | Ser | Thr | Pro | Asn | Gln | Asp | Ser |
| 15 |     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |
|    | Pro | Ile | Met | Glu | Gly | Lys | Thr | Pro | Ile | Leu | Gly | Leu | Asp | Val | Trp | Glu |
|    |     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| 20 | His | Ala | Tyr | Tyr | Leu | Lys | Tyr | Gln | Asn | Arg | Arg | Pro | Glu | Tyr | Ile | Ala |
|    |     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
|    | Ala | Phe | Trp | Asn | Val | Val | Asn | Trp | Asp | Glu | Val | Ala | Lys | Arg | Tyr | Ser |
|    |     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| 25 | Glu | Ala | Lys | Ala | Lys | Gln | Arg | Ser | Cys | Gly | Leu | Val | Pro | Arg | Gly | Ser |
|    | 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
|    | Gly | Pro | Gly | Ser | Lys | Ala | Pro | Pro | Arg | Leu | Cys | Ile | Arg | Val | Asn | Asn |
| 30 |     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
|    | Arg | Glu | Leu | Phe | Phe | Val | Ala | Ser | Glu | Ser | Ser | Tyr | Asn | Glu | Asn | Asp |
|    |     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| 35 | Ile | Asn | Thr | Pro | Lys | Glu | Ile | Asp | Asp | Thr | Thr | Asn | Leu | Asn | Asn | Asn |
|    |     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
|    | Tyr | Arg | Asn | Asn | Leu | Asp | Glu | Val | Ile | Leu | Asp | Tyr | Asn | Ser | Glu | Thr |
|    |     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| 40 | Ile | Pro | Gln | Ile | Ser | Asn | Gln | Thr | Leu | Asn | Thr | Leu | Val | Gln | Asp | Asp |
|    | 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
|    | Ser | Tyr | Val | Pro | Arg | Tyr | Asp | Ser | Asn | Gly | Thr | Ser | Glu | Ile | Glu | Glu |
| 45 |     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
|    | His | Asn | Val | Val | Asp | Leu | Asn | Val | Phe | Phe | Tyr | Leu | His | Ala | Gln | Lys |
|    |     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| 50 | Val | Pro | Glu | Gly | Glu | Thr | Asn | Ile | Ser | Leu | Thr | Ser | Ser | Ile | Asp | Thr |
|    |     |     | 355 |     |     |     |     | 360 |     |     |     |     |     | 365 |     |     |
|    | Ala | Leu | Ser | Glu | Glu | Ser | Gln | Val | Tyr | Thr | Phe | Phe | Ser | Ser | Glu | Phe |
|    |     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| 55 | Ile | Asn | Thr | Ile | Asn | Lys | Pro | Val | His | Ala | Ala | Leu | Phe | Ile | Ser | Trp |
|    | 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
|    | Ile | Asn | Gln | Val | Ile | Arg | Asp | Phe | Thr | Thr | Glu | Ala | Thr | Gln | Lys | Ser |
| 60 |     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
|    | Thr | Phe | Asp | Lys | Ile | Ala | Asp | Ile | Ser | Leu | Val | Val | Pro | Tyr | Val | Gly |
|    |     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| 65 | Leu | Ala | Leu | Asn | Ile | Gly | Asn | Glu | Val | Gln | Lys | Glu | Asn | Phe | Lys | Glu |
|    |     |     | 435 |     |     |     | 440 |     |     |     |     |     | 445 |     |     |     |
|    | Ala | Phe | Glu | Leu | Leu | Gly | Ala | Gly | Ile | Leu | Leu | Glu | Phe | Val | Pro | Glu |

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|    | 450     | 455     | 460     |
|----|---------|---------|---------|
| 5  | Leu 465 | Ile 470 | Leu 475 |
|    | Leu 465 | Ile 470 | Leu 475 |
|    | Leu 465 | Ile 470 | Leu 475 |
|    | Leu 465 | Ile 470 | Leu 475 |
| 10 | Met 500 | Glu 505 | Ile 510 |
|    | Met 500 | Glu 505 | Ile 510 |
|    | Met 500 | Glu 505 | Ile 510 |
|    | Met 500 | Glu 505 | Ile 510 |
| 15 | Met 530 | Glu 535 | Ile 540 |
|    | Met 530 | Glu 535 | Ile 540 |
|    | Met 530 | Glu 535 | Ile 540 |
|    | Met 530 | Glu 535 | Ile 540 |
| 20 | Glu 545 | Tyr 550 | Leu 555 |
|    | Glu 545 | Tyr 550 | Leu 555 |
|    | Glu 545 | Tyr 550 | Leu 555 |
|    | Glu 545 | Tyr 550 | Leu 555 |
| 25 | Ser 580 | Glu 585 | Ile 590 |
|    | Ser 580 | Glu 585 | Ile 590 |
|    | Ser 580 | Glu 585 | Ile 590 |
|    | Ser 580 | Glu 585 | Ile 590 |
| 30 | Glu 610 | Tyr 615 | Leu 620 |
|    | Glu 610 | Tyr 615 | Leu 620 |
|    | Glu 610 | Tyr 615 | Leu 620 |
|    | Glu 610 | Tyr 615 | Leu 620 |
| 35 | His 625 | Arg 630 | Leu 635 |
|    | His 625 | Arg 630 | Leu 635 |
|    | His 625 | Arg 630 | Leu 635 |
|    | His 625 | Arg 630 | Leu 635 |
| 40 | Thr 645 | Ser 650 | Leu 655 |
|    | Thr 645 | Ser 650 | Leu 655 |
|    | Thr 645 | Ser 650 | Leu 655 |
|    | Thr 645 | Ser 650 | Leu 655 |
| 45 | Asn 660 | Glu 665 | Ile 670 |
|    | Asn 660 | Glu 665 | Ile 670 |
|    | Asn 660 | Glu 665 | Ile 670 |
|    | Asn 660 | Glu 665 | Ile 670 |
| 50 | Lys 675 | Arg 680 | Leu 685 |
|    | Lys 675 | Arg 680 | Leu 685 |
|    | Lys 675 | Arg 680 | Leu 685 |
|    | Lys 675 | Arg 680 | Leu 685 |
| 55 | Asp 690 | Ser 695 | Leu 700 |
|    | Asp 690 | Ser 695 | Leu 700 |
|    | Asp 690 | Ser 695 | Leu 700 |
|    | Asp 690 | Ser 695 | Leu 700 |
| 60 | Ile 705 | Arg 710 | Leu 715 |
|    | Ile 705 | Arg 710 | Leu 715 |
|    | Ile 705 | Arg 710 | Leu 715 |
|    | Ile 705 | Arg 710 | Leu 715 |
| 65 | Ser 725 | Glu 730 | Ile 735 |
|    | Ser 725 | Glu 730 | Ile 735 |
|    | Ser 725 | Glu 730 | Ile 735 |
|    | Ser 725 | Glu 730 | Ile 735 |
|    | Tyr 740 | Arg 745 | Leu 750 |
|    | Tyr 740 | Arg 745 | Leu 750 |
|    | Tyr 740 | Arg 745 | Leu 750 |
|    | Tyr 740 | Arg 745 | Leu 750 |
|    | Asn 755 | Glu 760 | Ile 765 |
|    | Asn 755 | Glu 760 | Ile 765 |
|    | Asn 755 | Glu 760 | Ile 765 |
|    | Asn 755 | Glu 760 | Ile 765 |
|    | Asn 770 | Glu 775 | Ile 780 |
|    | Asn 770 | Glu 775 | Ile 780 |
|    | Asn 770 | Glu 775 | Ile 780 |
|    | Asn 770 | Glu 775 | Ile 780 |
|    | Trp 785 | Arg 790 | Leu 795 |
|    | Trp 785 | Arg 790 | Leu 795 |
|    | Trp 785 | Arg 790 | Leu 795 |
|    | Trp 785 | Arg 790 | Leu 795 |
|    | Tyr 805 | Glu 810 | Ile 815 |
|    | Tyr 805 | Glu 810 | Ile 815 |
|    | Tyr 805 | Glu 810 | Ile 815 |
|    | Tyr 805 | Glu 810 | Ile 815 |

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Val Thr Ile Thr Asn Asn Arg Leu Gly Asn Ser Arg Ile Tyr Ile Asn  
 820 825 830  
 5 Gly Asn Leu Ile Asp Glu Lys Ser Ile Ser Asn Leu Gly Asp Ile His  
 835 840 845  
 Val Ser Asp Asn Ile Leu Phe Lys Ile Val Gly Cys Asn Asp Thr Arg  
 850 855 860  
 10 Tyr Val Gly Ile Arg Tyr Phe Lys Val Phe Asp Thr Glu Leu Gly Lys  
 865 870 875 880  
 Thr Glu Ile Glu Thr Leu Tyr Ser Asp Glu Pro Asp Pro Ser Ile Leu  
 885 890 895  
 15 Lys Asp Phe Trp Gly Asn Tyr Leu Leu Tyr Asn Lys Arg Tyr Tyr Leu  
 900 905 910  
 Leu Asn Leu Leu Arg Thr Asp Lys Ser Ile Thr Gln Asn Ser Asn Phe  
 915 920 925  
 Leu Asn Ile Asn Gln Gln Arg Gly Val Tyr Gln Lys Pro Asn Ile Phe  
 930 935 940  
 25 Ser Asn Thr Arg Leu Tyr Thr Gly Val Glu Val Ile Ile Arg Lys Asn  
 945 950 955 960  
 Gly Ser Thr Asp Ile Ser Asn Thr Asp Asn Phe Val Arg Lys Asn Asp  
 965 970 975  
 30 Leu Ala Tyr Ile Asn Val Val Asp Arg Asp Val Glu Tyr Arg Leu Tyr  
 980 985 990  
 Ala Asp Ile Ser Ile Ala Lys Pro Glu Lys Ile Ile Lys Leu Ile Arg  
 995 1000 1005  
 35 Thr Ser Asn Ser Asn Asn Ser Leu Gly Gln Ile Ile Val Met Asp Ser  
 1010 1015 1020  
 40 Ile Gly Asn Asn Cys Thr Met Asn Phe Gln Asn Asn Asn Gly Gly Asn  
 1025 1030 1035 1040  
 Ile Gly Leu Leu Gly Phe His Ser Asn Asn Leu Val Ala Ser Ser Trp  
 1045 1050 1055  
 45 Tyr Tyr Asn Asn Ile Arg Lys Asn Thr Ser Ser Asn Gly Cys Phe Trp  
 1060 1065 1070  
 50 Ser Phe Ile Ser Lys Glu His Gly Trp Gln Glu Asn  
 1075 1080  
 55 <210> 9  
 <211> 229  
 <212> PRT  
 <213> Artificial Sequence  
 60 <220>  
 <223> Description of Artificial Sequence: polypeptide  
 comprising a mitochondrial leader from human MnSOD  
 and B. Stearothermophilus SOD  
 65 <400> 9  
 Met Leu Ser Arg Ala Val Cys Gly Thr Ser Arg Gln Leu Ala Pro Ala  
 1 5 10 15

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Leu Gly Tyr Leu Gly Ser Arg Gln Lys His Ser Arg Gly Ser Pro Ala  
                     20                    25                    30  
 5 Leu Pro Tyr Pro Tyr Asp Ala Leu Glu Pro His Ile Asp Lys Glu Thr  
                     35                    40                    45  
 Met Asn Ile His His Thr Lys His His Asn Thr Tyr Val Thr Asn Leu  
                     50                    55                    60  
 10 Asn Ala Ala Leu Glu Gly His Pro Asp Leu Gln Asn Lys Ser Leu Glu  
                     65                    70                    75                    80  
 Glu Leu Leu Ser Asn Leu Glu Ala Leu Pro Glu Ser Ile Arg Thr Ala  
                                     85                    90                    95  
 15 Val Arg Asn Asn Gly Gly Gly His Ala Asn His Ser Leu Phe Trp Thr  
                             100                    105                    110  
 Ile Leu Ser Pro Asn Gly Gly Gly Glu Pro Thr Gly Glu Leu Ala Asp  
                     115                    120                    125  
 Ala Ile Asn Lys Lys Phe Gly Ser Phe Thr Ala Phe Lys Asp Glu Phe  
                     130                    135                    140  
 25 Ser Lys Ala Ala Ala Gly Arg Phe Gly Ser Gly Trp Ala Trp Leu Val  
                     145                    150                    155                    160  
 Val Asn Asn Gly Glu Leu Glu Ile Thr Ser Thr Pro Asn Gln Asp Ser  
                             165                    170                    175  
 30 Pro Ile Met Glu Gly Lys Thr Pro Ile Leu Gly Leu Asp Val Trp Glu  
                             180                    185                    190  
 35 His Ala Tyr Tyr Leu Lys Tyr Gln Asn Arg Arg Pro Glu Tyr Ile Ala  
                     195                    200                    205  
 Ala Phe Trp Asn Val Val Asn Trp Asp Glu Val Ala Lys Arg Tyr Ser  
                     210                    215                    220  
 40 Glu Ala Lys Ala Lys  
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- 23 -

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<223> Description of Artificial Sequence: modified human  
mitochondrial leader sequence

5

&lt;400&gt; 11

Met Leu Ser Arg Ala Val Cys Gly Thr Ser Arg Gln Leu Ala Pro Ala  
1 5 10 15

10

Leu Gly Tyr Leu Gly Ser Arg Gln  
20